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tures 'delivered at' Woods Holl, but contains in addition to such lectures essays written especially for the volume by persons not in attendance at the session, but in sympathy with the work of the laboratory. At present, then, the volume may be said to be representative of American biology. In its scope the volume is unique; its contents are addressed by naturalists to a general biological audience—an audience which demands at once that the author shall have something worth while to say and that he shall say it in an intelligible manner, free from the burden of a very special and technical nomenclature, while scientific rather than popular.

There are sixteen lectures in this volume, of which four are botanical. D. H. Campbell treats of the 'Evolution of the Sporophyte'; D. P. Penhallow of the 'Nature of the Evidence exhibited by Fossil Plants'; and D. T. MacDougal has two papers on the 'Influence of Vertical Air Currents upon Distribution' and on 'Mycorrhizas,' respectively. Then follow three papers of general psychological interest; two by Edward Thorndike on 'Instinct' and 'The Associative Processes in Animals,' based on his own illuminating investigations, and one by H. S. Jennings giving a resumé of his brilliant results on the 'Reactions of Unicellular Organisms.' C. H. Eigenmann contributes a paper on 'The Blind Fishes' and A. Hyatt, a 30-page paper on 'Some Governing Factors usually neglected in Biological Investigations,' which calls for an appreciation of meta-genetic (gerontic) stages in ontogeny, defends the 'law of tachygenesis or accelerated development' and argues for the memory theory of heredity. A. G. Mayer discusses the ontogenesis and phylogenetic significance of color in Lepidoptera. A. Mathews analyzes the different methods of animal secretions and combats the theory of special secretory nerves. T. H. Morgan discusses some old and new interpretations of regeneration. G. N. Calkins draws important general cytological conclusions from the varied forms of nuclear division in protozoa. C. M. Child after giving his researches on spiral cleavage concludes that it is the organism—the individual—which is the unit and not the cell. The reviewer writes of the aims of the quantitative study of variation

and J. Loeb tells of his success in getting unfertilized eggs of sea urchins to develop into larvæ under the action of magnesium chloride. The mere enumeration of these subjects indicates that biological investigation in this country to-day occupies a broad field.

C. B. DAVENPORT.

*A Manual of Elementary Practical Physics.* By JULIUS HORTVET, B.S. Minneapolis, H. W. Wilson. 1900.

During the last few years which have been signalized by the great extension of laboratory instruction in physics in the secondary schools of this country, so many new text-books of physics have been published that one can scarcely treat a new-comer without prejudice. These books must avoid a Scylla and Charybdis quite as dangerous as those which threatened Ulysses. On the one hand they fail by trying to be too general, applicable to too many cases, the school, the college and even the university; on the other hand they represent some particular, special course which their author has worked up, too often with some personal hobby for certain things. In this last class fall those courses which are designed as an entrance requirement for some college, and which are too much elementary mechanics and too little physics.

Mr. Hortvet has recognized that it is his duty to give his students the best possible course in general physics which they can utilize, without leaving it to a possible college course to give the real fundamentals. It is the business of the college to coordinate its work upon that of the high school, provided only that the high school is doing the right work and doing it well. Mr. Hortvet understands that his laboratories are neither kindergartens nor research laboratories.

Many teachers with the catch words of *intensive*, rather than *extensive*, fail to apprehend the real meaning of the terms, and are so extensive in their desire to be intensive that the scholar is lost in a mass of details and gets no fundamental principles. These teachers feel that they could not touch the subject of refraction of light without including anomalous dispersion and double refraction, and hence dawdle

upon a mass of insignificant experiments in mechanics. This book is decidedly the best setting forth of the best collection of experiments for secondary school work which I have been able to obtain. From the contents it will be seen how well the choice of experiments in the various subjects has been made: General and mechanics, 14 heads; sound, 2; heat, 6; light, 7; and electricity and magnetism, 9. Or by pages: General and mechanics, 100; sound, 12; heat, 30; light, 32; electricity, 55.

The general instructions are very good and well presented. The line illustrations are thoroughly satisfactory; they have been made for this book and are not reproductions of hackneyed and inapplicable cuts from other texts. To be commended are also the outline tables and suggestions for making the records in the note book. In fact there is so little to find fault with in the book that the little may be ignored.

The book is its own evidence of the practical work the author has been doing in his schools and is at once a guide and a standard for other teachers. The book should be in every laboratory where physics is taught.

W. HALLOCK.

*An Inquiry into the Conditions relating to the Water Supply of the City of New York.* By the Merchants' Association of New York. Copyright by The Merchants' Association, 1900. Published by the Association at its office, New York Life Building, New York City. 1900. 8vo. Cloth. Pp. xxxix + 627.

This large and well-filled volume is perhaps the most important technical municipal document ever issued from our modern press, either public or private. It presents the results of very complete study of the problem of water supply to the City of New York, made by a committee of experts of national and international reputation, under the direction of the Merchants' Association of that city. It was conducted purely as a matter of patriotism and public spirit, especially for the purpose of securing a reliable and useful collection of facts and data with which to throw light upon the great municipal question raised by the famous

Ramapo contract. It is important in itself as giving an enormous amount of essential information, and hardly less so as illustrating a degree of public spirit and an extent of intelligent research relating to scientific and technical questions such as, perhaps, was never before seen as the product of a patriotic spirit in municipal affairs. The Association expended \$33,000 in the work, and its officers and aids gave their services; even the experts in law, engineering and other departments giving their services to the value of tens of thousands of dollars and conducting investigations of very great extent and of immense value without charge. The costs incurred were defrayed by individuals who voluntarily advanced the money, and only about one-third of the total had been received from subscriptions at the date of the publication of the reports. The public spirit of the average citizen of New York is as remarkable for its diminutiveness as is that of a few individuals for liberality and self-sacrifice.

Thirty-three men of distinction in their several professions constituted the General Committee, and such men as Messrs. Bannin and Deming, Professor Goodnow, and Mr. LeGendre were on the Executive Committee; Messrs. Clarke, Hering, North, Stauffer, Prout, Bowker, Towne, Dresser, Olcott and Haines constituted the Engineering Committee and Deming, Sterne, Hinrichs, Dr. Edson, Fowler, Albert Shaw, Schiff, Maltbie and Mayo-Smith that on Finance and Public Policy. The Counsel were Messrs Dill, Peckham, McCurdy and Conklin. Mr. James H. Fuertes was employed to report on 'Sources of Future Supply' and valuable reports were obtained from Mr. Rafter on the 'Adirondack Supply,' Mr. Croes on 'Past and Present Supply,' from Mr. Crowell on 'Auxiliary Salt Water Supply,' and from Mr. Ward on 'Pumping Stations and Water Distribution.' Mr. Coler, the Comptroller, gave the committee most valuable assistance. The engineering, legal and commercial lines of business were thus well represented, and it is doubtful if any private enterprise could have brought together such an array of professional talent or secured so complete and useful a study of the situation and its demands.

The gist of the matter is that New York